



Air Force Next-Generation Bomber: Background and Issues for Congress

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Summary

As part of its proposed FY2010 defense budget, the Administration is proposing to defer the start of a program to develop a next-generation bomber (NGB) for the Air Force, pending the completion of the 2010 Quadrennial Defense Review (QDR) and associated Nuclear Posture Review (NPR), and in light of strategic arms control negotiations with Russia. The Administration's proposed FY2010 budget requests no funding specifically identified in public budget documents as being for an NGB program. Prior to the submission of the FY2010 budget, the Air Force was conducting research and development work aimed at fielding a next-generation bomber by 2018.

Although the proposed FY2010 defense budget proposes to defer the start of an NGB program, Air Force officials in 2009 have expressed support for the need to eventually start such a program. The Air Force's FY2010 unfunded requirements list (URL)—a list of programs desired by the Air Force but not funded in the Air Force's proposed FY2010 budget—includes a classified \$140-million item that some press accounts have identified as being for continued work on a next-generation bomber.

A key issue for Congress in FY2010 is whether to provide funding in FY2010 for an NGB program. A second issue is whether to enact legislation that would amend or add to prior-year legislation on bomber force structure.

The House Armed Services Committee, in its report (H.Rept. 111-166 of June 18, 2009) on the FY2010 defense authorization bill (H.R. 2647), recommends authorizing no FY2010 funding in the Air Force research and development line item (PE0604015F) that is explicitly identified in public budget documents as being for a next-generation bomber. The report recommends \$215 million in additional funding in the Air Force research and development account for a line item identified as "Other Programs," but it is not clear whether any of this funding is related to a next-generation bomber. Section 1032 of H.R. 2647 would require the Secretary of Defense to submit a report to the congressional defense committees on the force structure findings of the QDR, including a discussion of bombers.

Division D of the FY2010 defense authorization bill (S. 1390) as reported by the Senate Armed Services Committee (S.Rept. 111-35 of July 2, 2009) presents the detailed line-item funding tables that in previous years have been included in the Senate Armed Services Committee's report on the defense authorization bill. Division D recommends authorizing no FY2010 funding in PE0604015F for development of a next-generation bomber. Division D recommends \$140 million in additional funding in the Air Force research and development account for a line item identified as "Other Programs," but it is not clear whether any of this funding is related to a next-generation bomber. Section 124 of S. 1390 would make it U.S. policy to support a development program for next-generation bomber aircraft technologies.

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Introduction

As part of its proposed FY2010 defense budget, the Administration is proposing to defer the start of a program to develop a next-generation bomber (NGB) for the Air Force, pending the completion of the 2010 Quadrennial Defense Review (QDR) and associated Nuclear Posture Review (NPR), and in light of strategic arms control negotiations with Russia. The Administration's proposed FY2010 budget requests no funding specifically identified in public budget documents as being for an NGB program. Prior to the submission of the FY2010 budget, the Air Force was conducting research and development work aimed at fielding a next-generation bomber by 2018.

Although the proposed FY2010 defense budget proposes to defer the start of an NGB program, Air Force officials in 2009 have expressed support for the need to eventually start such a program. The Air Force's FY2010 unfunded requirements list (URL)—a list of programs desired by the Air Force but not funded in the Air Force's proposed FY2010 budget—includes a classified \$140-million item that some press accounts have identified as being for continued work on a next-generation bomber.

A key issue for Congress in FY2010 is whether to provide funding in FY2010 for an NGB program. A second issue is whether to enact legislation that would amend or add to prior-year legislation on bomber force structure. Congress's decisions on these issues could affect Air Force capabilities and funding requirements, and the U.S. aircraft manufacturing industrial base.

Background

Administration Proposal to Defer Start of NGB Program

April 6, 2009, News Conference

At an April 6, 2009, news conference on recommendations he was making for the proposed FY2010 defense budget, Secretary of Defense Robert Gates announced, among other things, that he would recommend deferring the start of a NGB program. Gates stated:

Last year's National Defense Strategy concluded that although U.S. predominance in conventional warfare is not unchallenged, it is sustainable for the medium term given current trends. This year's budget deliberations focused on what programs are necessary to deter aggression, project power when necessary, and protect our interests and allies around the globe. To this end, I will recommend new or additional investments and shifts in several key areas:...

8. With regard to our nuclear and strategic forces:...

- We will not pursue a development program for a follow-on Air Force bomber until we have a better understanding of the need, the requirement, and the technology.

- We will examine all of our strategic requirements during the Quadrennial Defense Review, the Nuclear Posture Review, and in light of Post-START arms control negotiations.¹

OMB Document on Proposed FY2010 Terminations, Reductions, and Savings

An Office of Management and Budget (OMB) document on terminations, reductions, and savings in the proposed FY2010 budget describes the proposal for the NGB program more as a termination than a deferral. The document states:

The Administration has decided not to pursue development of a new long-range bomber, which the Department of Defense (DOD) had planned to begin fielding in 2018 as a means of augmenting the existing bomber fleet. The existing fleet of 173 bombers will be able to meet expected threats....

The 2006 Quadrennial Defense Review proposed that DOD develop a new long-range heavy bomber by 2018 to augment the current bomber fleet of B-52s, B-2s and B-1Bs. The Administration has decided not to pursue technology efforts aimed at developing a new bomber because the current fleet is performing well. Further, as a result of ongoing efforts to upgrade the existing bomber fleet with new electronic and weapons systems, current aircraft will be able to meet the threats expected in the foreseeable future. Since there is no urgent need to begin an expensive development program for a new bomber, the Department will utilize the additional time to develop a better understanding of the requirement and to develop the technologies most suitable for a long-range bomber. Also, the Congressional Budget Office, in its analysis of the long-term implications of the defense program, concluded that DOD's weapons acquisition program, including the future bomber fleet, may not be affordable over the next six years. Not pursuing this program will result in savings of several hundred million dollars through 2013.²

Report of QDR "Tiger Team" for Next-Generation Bomber

A July 2009 press report stated that:

The Pentagon has established a "tiger team" to study the Air Force's Next-Generation Bomber requirement and make recommendations that will influence the high-profile Quadrennial Defense Review, according to a senior Defense Department official.

"That group is reexamining both the nature of that [long-range strike] mission and opportunities for accomplishing that mission technologically and conceptually," David Ochmanek, deputy assistant secretary of defense for force development and head of the QDR analysis and integration cell, told defense reporters on July 28 in Washington.

The panel is expected to deliver its report to Defense Secretary Robert Gates in the early fall, according to Ochmanek.³

¹ Department of Defense, *Defense Budget Recommendation Statement* (Arlington, VA), As Prepared for Delivery by Secretary of Defense Robert M. Gates, Arlington, VA, Monday, April 06, 2009, available online at <http://www.defenselink.mil/speeches/speech.aspx?speechid=1341>.

² Office of Management and Budget, *Terminations, Reductions, and Savings, Budget of the U.S. Government, Fiscal Year 2010*, p. 44.

³ Marcus Weisgerber, "QDR Tiger Team To Study Air Force's Long-Range Strike Mission," *Inside the Air Force*, July 31, 2009. Material in brackets as in original.

FY2010 Funding Request and Anticipated Events

The Air Force's research and development account includes a line item—Program Element (PE) 0604015F, Next Generation Long Range Strike (NGLRS)—that since the FY2005 budget submission has included funded explicitly identified in public budget documents as being for development of a next-generation bomber. The Administration's proposed FY2010 defense budget requests no funding for this line item for FY2010-FY2015.

The description of PE0604015F in the FY2010 budget submission notes a request for \$43.9 million (and projected requests of \$47.5 million in FY2011 and \$14.5 million in FY2012) for another Air Force research and development line item—PE0604830F, Automated Air-to-Air Refueling—that “develops, demonstrates and validates the ability of air refuel an aircraft without pilot intervention, in support of Next Generation Long Range Strike development strategies.”⁴

The FY2010 budget submission shows concept refinement on a next-generation long-range strike capability extending through the third quarter of FY2011, and the Automated Aerial Refueling phase two demonstration extending through the fourth quarter of FY2012.⁵

FY2010 Air Force URL

The Air Force's FY2010 unfunded requirements list (URL)—a list of programs desired by the Air Force but not funded in the Air Force's proposed FY2010 budget—includes a classified \$140-million item that some press reports have identified as being for continued work on a next-generation bomber.⁶ The \$140 million item is the ninth of the 20 items on the URL. The total estimated cost of the 20 items on the URL is \$1,909 million.

Reported Instruction to Contractors to End Work

A June 2009 press report stated:

The Pentagon told two groups that have been researching the U.S. Air Force's long-range bomber to quietly close up shop while the service's leaders stumped on the Hill for a long-range strike capability, according to analysts and defense industry sources.

U.S. Defense Department officials gave the order in the first week of June to the research teams, one from Northrop Grumman and a combined Boeing-Lockheed Martin shop, said

⁴ Department of the Air Force, *Fiscal Year (FY) 2010 Budget Estimates, Research, Development, Test and Evaluation (RDT&E) Descriptive Summaries, Volume II, Budget Activities 4 – 6*, May 2009, [PE]0604015F, Next Generation Long Range Strike, R-1 Line Item No. 50 (pages 165-169). See also Marcus Weisgerber, “Air Force Still Putting Millions of Dollars Toward Next-Gen Bomber,” *Inside the Air Force*, May 15, 2009.

⁵ Department of the Air Force, *Fiscal Year (FY) 2010 Budget Estimates, Research, Development, Test and Evaluation (RDT&E) Descriptive Summaries, Volume II, Budget Activities 4 – 6*, May 2009, [PE]0604015F, Next Generation Long Range Strike, R-1 Line Item No. 50 (pages 165-169).

⁶ See Marcus Weisgerber, “Air Force Unfunded List Includes a Classified \$140 Million Line for a New Bomber,” *InsideDefense.com (DefenseAlert – Daily News)*, June 5, 2009 (a similar article was published as Marcus Weisgerber, “Schwartz: Air Force Needs To Keep Developing Bomber Technology,” *Inside the Air Force*, June 12, 2009). See also Sam Lagrone, “DoD Quietly Ends Bomber Research Effort,” *Defense News*, June 15, 2009: 4; and Marcus Weisgerber, “QDR Tiger Team To Study Air Force's Long-Range Strike Mission,” *Inside the Air Force*, July 31, 2009.

Loren Thompson, a defense analyst with the Arlington, Va.-based Lexington Institute, a think tank.

“For now, there is no program because the contractors are being told to wrap it up,” Thompson said.⁷

Comments by Secretary of Defense

Speech and Magazine Articles

In a September 29, 2008, speech at the National Defense University, Secretary of Defense Gates stated:

Other nations may be unwilling to challenge the United States fighter to fighter, ship to ship, tank to tank. But they are developing the disruptive means to blunt the impact of American power, narrow our military options, and deny us freedom of movement and action.

In the case of China, investments in cyber-and anti-satellite warfare, anti-air and anti-ship weaponry, submarines, and ballistic missiles could threaten America’s primary means to project power and help allies in the Pacific: our bases, air and sea assets, and the networks that support them. This will put a premium on America’s ability to strike from over the horizon, employ missile defenses, and will require shifts from short-range to longer-range systems such as the Next Generation Bomber.⁸

Secretary Gates included similar passages in an article he wrote for the January 2009 issue of *Foreign Affairs* magazine⁹ and an article he wrote for the First Quarter 2009 issue of *Joint Force Quarterly* magazine.¹⁰

Testimony at May 14, 2009, Hearing

At a May 14, 2009, hearing before the Senate Armed Services Committee on the proposed FY2010 defense budget, Secretary Gates was asked by Senator John Thune about his position on a next-generation bomber. The text of Secretary Gates’s exchange with Senator Thune is as follows:

THUNE:

Mr. Secretary, I want to raise an issue with you which probably comes as no surprise. But on April the 7th at a media roundtable, you said that the 2010 defense budget recommendations that you announced on April the 6th are, quote, “basically an outgrowth of the positions that I have been taking in speeches for the last 18 months,” and that your decisions, “didn’t spring all of a sudden, full-grown out of the brow of Zeus in the last three months,” end quote.

⁷ Sam Lagrone, “DoD Quietly Ends Bomber Research Effort,” *Defense News*, June 15, 2009: 4.

⁸ Transcript of speech as delivered, available online at <http://www.defenselink.mil/speeches/speech.aspx?speechid=1279>.

⁹ Robert M. Gates, “A Balanced Strategy: Reprogramming The Pentagon For A New Age,” *Foreign Affairs*, January 2009.

¹⁰ Robert M. Gates, “The National Defense Strategy, Striking the Right Balance,” *Joint Force Quarterly*, 1st Quarter 2009: 2-7, available online at http://www.ndu.edu/inss/Press/jfq_pages/editions/i52/1.pdf.

But I think it's fair to say that the decision on the next generation bomber must have sprung full-grown out of the brow of Zeus in the last three months. And I want to point back to something that you said eight months ago during a speech at the National Defense University where you said that China's—and again I quote—"investments in cyber and anti-satellite warfare, anti-air and anti- ship weaponry, submarines and ballistic missiles could threaten America's primary means to project power and help allies in the Pacific. This will put a premium on America's ability to strike from over the horizon, employ missile defenses and will require shifts from short range to long range systems such as the next generation bomber," end quote.

And you use virtually the same language in an article for the first quarter 2009 edition of Joint Force Quarterly as well as in a foreign affairs article in January of this year. And so, for several months prior to that April 6th announcement you had established a clear record of support for the next generation bomber. On April the 6th, you announced that the department would not pursue a development program for the follow-on Air Force bomber.

My question is what changed between January and April to make you question the need for the next generation bomber. And how do you reconcile clearly positions that are contradictory with regard to that weapons system?

GATES:

Actually, this is one of the issues, Senator, that where I felt we did not have enough analysis to make a firm decision. And so, it's one of the issues that will be addressed in both the quadrennial defense review and the nuclear posture review.

My own personal view is we probably do need a follow-on bomber. But I think we need to see what—if you look at both of those studies, the QDR and the nuclear posture review and you observe what is going on in the arms control negotiations with Russia, in particular, on nuclear forces, I think all of those things will shape what decision needs to be made with respect to a next generation bomber.

One of the reasons that I said we would cancel the studies or the effort that was underway at the time was based on consultation with the chairman and the vice chairman and others. Our concern was that if we didn't do that, that when these studies were done, there would be a kind of a linear projection of the thinking that had existed before the studies were done in terms of exactly what kind of planes should be built.

One of the things I think we need to think about is whether, for example, the follow-on bomber needs to have a pilot in it. And so, I think that this is one of those issues that I didn't make a decision against going forward with the next generation bomber, but rather said let's wait and see what the result. Let's examine this in the QDR and in the nuclear posture review and then make a decision on where we go with the next generation bomber.

THUNE:

Well, in response to a question that was posed by Senator Inhofe earlier, you said that the last QDR, the 2006 QDR, shaped and informed a lot of your decisions. And the 2006 QDR directed the Air Force to field the follow-on bomber by the year 2018.

And so, I guess my question is what part of that QDR has been invalidated or what has changed in terms of the threat-based analysis that, in your mind, modifies or changes that requirement? I mean, it's pretty clearly articulated in the 2006 QDR. And that's actually what helped shaped many of your decisions with respect to some of these decisions that you made recently.

GATES:

Well, I mean, the reality is that we have a lot more experience in the last two to three years with unmanned aerial vehicles than—than they had at the time that the last QDR was put together.

Also, we basically weren't going anywhere at the last time of the last QDR in terms of significant potential further arms reductions with—with the Russians, and I think depending on where those numbers come out, it's going to—it's going to affect how we shape the triad or whether—or raise the question whether we still need a triad, depending on the number of deployed weapons that—nuclear weapons that we need.

THUNE:

It doesn't seem like that those discussions with Russia, though, ought to have an impact on whether or not we're developing the next-generation bomber.

And, secondly, I mean, I think that—and you've had experience in some of those arms reductions negotiations in the past. If they are supposed to conclude by the end of this year, I'd—I'd be very surprised if they will, and this could extend sometime into the future.

So, you know, making a decision like this right now, I guess, to me, it becomes a question of whether or not this is driven more by budget decisions and trying to get under the top line of the defense budget or whether it's driven by requirements, and—and I guess that would be my question. I mean, is this a decision that—did OMB say you've got to terminate this—this program?

GATES:

No, I don't—I don't remember what their pass back said, but, frankly, I took some of their suggestions from the pass back and didn't take a lot of others. This actually didn't really have a—this really was not a top line or a budget-driven figure because the amount of money in the budget for FY '10 for a next-generation bomber was very small.¹¹

Comments by Air Force Officials

Some Air Force officials in 2009 have expressed support for eventually starting an NGB program, or have expressed optimism that such a program will eventually be implemented, following the completion of the 2010 QDR and the Nuclear Posture Review.¹² A May 2009 press report stated:

The Air Force's top general this week outlined the four big-ticket items he would like to see added to the Pentagon's fiscal year 2010 budget. These weapons programs come in addition to the service's—relatively small—\$1.9 billion unfunded priorities list that was sent to

¹¹ Source: Transcript of hearing.

¹² See, for example, Marina Malenic, "Air Force Sees Next Generation Bomber Buy Secure Despite Gates' Delay," *Defense Daily*, April 22, 2009; David A. Fulghum, "USAF Bomber Grounded By More Than Budget: 8th AF Chief," *Aerospace Daily & Defense Report*, April 23, 2009: 5; John M. Doyle, "Boosting F-35 Line, Planning New Bomber Tops Schwartz Wish List," *Aerospace Daily & Defense Report*, May 20, 2009: 1-2; Marcus Weisgerber, "USAF Reshaping Acquisition Priorities Due To Program Cancellations," *Inside the Air Force*, May 22, 2009; Chris Castelli, "Bomber Ideas," *InsideDefense.com (Defense: Next)*, May 22, 2009; Marcus Weisgerber, "QDR Tiger Team To Study Air Force's Long-Range Strike Mission," *Inside the Air Force*, July 31, 2009.

Congress May 18. That list featured relatively minor purchases and upgrades for a variety of weapon systems.

Speaking on May 19 before the House Armed Services Committee, Air Force Chief of Staff Gen. Norton Schwartz gave his wish list—ranging from upgraded legacy fighters to more automation technology in unmanned aerial systems—for equipping a 21st-century Air Force.

The general told lawmakers his No. 1 priority would be putting more money into modernizing existing fighters, followed by accelerating F-35 Joint Strike Fighter production to maximum levels. Next came ensuring funding for a new long-range strike capability. Finally, he said, he would like to secure development funds to make it possible for one aircrew to operate multiple unmanned aerial vehicles at once....

Schwartz's desire for a new long-range strike capability comes after Gates cut funding for the Air Force's next-generation Bomber program in the FY-10 budget request.

Schwartz' No. 3 priority is for the Pentagon "to acknowledge that there is a requirement for the armed forces to own a long-range strike capability, that long-range strike capability needs to be properly defined," said Schwartz. "It's probably a bomber of some variety and so on, but we need through the [Quadrennial Defense Review] to get our secretary of defense comfortable with the parameters that we proposed for that platform."...

The four-star added that the service will "leave no stone unturned" to make sure Gates is "comfortable" with the requirements for a platform that can threaten any target around the globe.¹³

Air Force officials have stated that a next-generation bomber is needed by about 2018 not because the service's older B-52H bombers are expected to retire by then, but because a key weapon carried by the B-52Hs—the air-launched cruise missile (ALCM)—could be removed from service by about then. An April 2009 press report stated that:

[Lieutenant General Robert] Elder [commander of the 8th Air Force,] said the B-52 Stratofortress will remain viable long past 2018, when the service had expected to begin procuring a next generation bomber. He said the platform will remain in service until at least 2040, but one of the nuclear-capable missiles it carries—the Air Launched Cruise Missile (ALCM)—will be decommissioned far sooner.

"2018 was an important date to put on the wall in terms of what they were looking for," Elder told reporters. "It doesn't have to do so much with when the B-52 is going out [of service], but that's tied to when the ALCM is really getting ready to go out of the inventory ... The B-52 itself is good until 2040, so 2018 is not tied to the air frame."

The ALCM has been operational since 1982 and initially had a 10-year service life, according to Air Force spokeswoman Capt. Elizabeth Aptekar.

"ALCM is solely carried on the B-52 (8 internal and 12 external)," she said via e-mail. "The ALCM fleet has undergone a Service Life Extension Program (SLEP) to allow ALCM retention to at least 2020 with the possibility to extend to 2030."

¹³ John Reed, "Schwartz Outlines Top Four Items Not Funded In FY-10 Budget Plan," *Inside the Pentagon*, May 21, 2009.

NGB Program Prior to FY2010 Budget Submission

Prior to the submission of the FY2010 budget, the Air Force was conducting research and development work aimed at fielding a next-generation bomber by 2018. Below is a summary description of the program.

Decision in 2006 Quadrennial Defense Review

The 2006 QDR called for the development of a next-generation bomber that would enter service by 2018. The final report on the 2006 QDR, released in February 2006 in conjunction with the proposed FY2007 defense budget, stated:

The Air Force has set a goal of increasing its long-range strike capabilities by 50% and the penetrating component of long-range strike by a factor of five by 2025. Approximately 45% of the future long-range strike force will be unmanned. The capacity for joint air forces to conduct global conventional strikes against time-sensitive targets will also be increased.

QDR Decisions. To achieve the future joint force characteristics and build on progress to date, the Department plans to:

Develop a new land-based, penetrating long-range strike capability to be fielded by 2018 while modernizing the current bomber force.

Reduce the B-52 force to 56 aircraft and use savings to fully modernize B-52s, B-1s, and B-2s to support global strike operations.¹⁴

Following the release of the final report on the 2006 QDR, the Air Force announced a three-phase study on implementing the decision on bombers. The Air Force testified in March 2006 that phase one would examine continued modifications and enhancements to the current bomber fleet, phase two would add \$1.6 billion to aid in development of the 2018 bomber, and about \$275 million would be set aside for phase three, which would examine bomber need “out beyond 2025 and 2030.”¹⁵

Prior to the 2006 QDR, the Air Force had indicated that its current bomber fleet would suffice until 2037, when advanced technologies, such as hypersonic cruise vehicles, would potentially reach maturity and be incorporated into a follow-on bomber aircraft. The 2006 QDR’s call for a new bomber that would enter service in 2018 thus accelerated Air Force plans for fielding a new bomber by almost 20 years.

Numbers of New Bombers Envisioned

The commander of U.S. Strategic Command in early 2008 discussed a need for at least 96 next-generation bombers, so as to replace the 76 B-52Hs and 20 B-2s that are capable of carrying

¹⁴ Department of Defense, *Quadrennial Defense Review Report*, February 6, 2006, p. 46. Emphasis as in original.

¹⁵ Matishak, Martin, “Hunter, Skelton Slam Air Force’s Proposed Plan to Retire B-52s Early,” *Inside the Air Force*, March 3, 2006.

nuclear weapons.¹⁶ Other press reports stated that the Air Force envisaged procuring about 100 new bombers.¹⁷

General Characteristics of Envisioned Aircraft

Testimony and press reports suggest that Air Force officials prior to the FY2010 budget submission envisaged the next-generation bomber as a new-design aircraft that use existing aircraft technologies, because the 2018 target in-service date would not allow enough time to develop new technologies.¹⁸ The aircraft would likely be subsonic and stealthy,¹⁹ it might have an unrefueled range of 2,000 to 3,000 miles,²⁰ and it might carry 28,000 to 40,000 pounds of armaments.²¹ Whether the aircraft would be manned or unmanned was not determined, but Air Force officials suggested that, in light of the 2018 target in-service date, the initial version of the aircraft, at least, would likely need to be manned.²² It was also stated that aircraft's basic design might also service as the basis of the design for a new Air Force long-range reconnaissance aircraft.²³

Expected Industry Competitors

The two expected competitors for the NGB program were Northrop and a team composed of Boeing and Lockheed.²⁴ Northrop was the prime contractor for the B-2, although Boeing was a major subcontractor. Rockwell International (now part of Boeing), was the prime contractor for the B-1. Boeing was the prime contractor for the B-52.

¹⁶ David A. Fulghum and Michael Bruno, "StratCom Chief Details Numbers For Next Bomber Fleet," *Aerospace Daily & Defense Report*, March 6, 2008: 4.

¹⁷ See, for example, Amy Butler, "USAF Chief De-emphasizes 2018 For Bomber," *Aerospace Daily & Defense Report*, March 4, 2009: 1-2.

¹⁸ See, for example, "Bomber Preview," *Aerospace Daily & Defense Report*, February 29, 2008: 4; "Bomber Talk Quietied," *Aerospace Daily & Defense Report*, August 4, 2008: 1.

¹⁹ Douglas Barrie and Amy Butler, "New USAF Bomber Could Fly As ISR Penetrator," *Aerospace Daily & Defense Report*, April 28, 2008: 3; Bill Sweetman, "Northrop Grumman Appears To Have Landed Classified Next-Gen Bomber Prototype," *Aerospace Daily & Defense Report*, May 28, 2009: 1-2.; "Bomber Talk Quietied," *Aerospace Daily & Defense Report*, August 4, 2008: 1; Marina Malenic, "Air Force See Next Generation Bomber Buy Secure Despite Gates' Delay," *Defense Daily*, April 22, 2009; David A. Fulghum, "USAF Bomber Grounded By More Than Budget: 8th AF Chief," *Aerospace Daily & Defense Report*, April 23, 2009: 5.

²⁰ Marcus Weisgerber, "CSBA: USAF Next-Generation Bomber Program Could Cost \$40 Billion," *Inside the Air Force*, February 6, 2009.

²¹ Douglas Barrie and Amy Butler, "Double Duty," *Aviation Week & Space Technology*, April 28, 2008: 24.

²² See, for example, Bettina H. Chavanne, "First Iteration Of Next-Gen Bomber Will Be Manned, ACC Chief Says," *Aerospace Daily & Defense Report*, March 28, 2008: 3.

²³ Douglas Barrie and Amy Butler, "Double Duty," *Aviation Week & Space Technology*, April 28, 2008: 24. A shorter version of the article was published as Douglas Barrie and Amy Butler, "New USAF Bomber Could Fly As ISR Penetrator," *Aerospace Daily & Defense Report*, April 28, 2008: 3.

²⁴ See, for example, Douglas Barrie and Amy Butler, "Double Duty," *Aviation Week & Space Technology*, April 28, 2008: 24; Amy Butler, "USAF Chief De-emphasizes 2018 For Bomber," *Aerospace Daily & Defense Report*, March 4, 2009: 1-2. Boeing and Lockheed announced their joint development effort for the NGB in January 2008. ("Boeing, Lockheed To Team Up For New Bomber," *Seattle Times*, January 25, 2008.)

An April 2008 press report stated that Secretary of the Air Force Michael Wynne “suggests [that] a decision on which design [i.e., the Northrop of Boeing/Lockheed design] to take forward into production would likely be made in 2012-2014.”²⁵

A May 2008 press report stated: “Northrop Grumman received contracts totaling more than \$2.5 billion for secret aircraft programs in the first quarter of 2008, strongly supporting reports and indications that the company has won a U.S. Air Force contract to build a prototype for the Next Generation Bomber (NGB) program.” The report also stated: “The Air Force and other sources have indicated that a full-scale competition for NGB will start around 2010, suggesting that the demonstrator should be flying by then and validating the basic concepts behind the design....”²⁶

Potential Acquisition Cost

In February 2009, an analyst for the Center for Strategic and Budget Assessments (CSBA), a policy research organization, estimated that a next-generation bomber acquisition program including the procurement of 50 to 60 aircraft might have an acquisition (i.e., research and development plus procurement) cost of \$30 billion to \$40 billion.²⁷

Funding

Prior-Year Funding

Table 1 summarizes prior-year funding in PE0604015F for the next-generation bomber. The funding shown in FY2004 and FY2005 was added by Congress. The Air Force’s research and development account also includes funding in other line items for the development of technologies that could be incorporated into the aircraft.²⁸ The program may also have received additional classified funding not identified in public budget documents. A June 2005 press report stated: “The Next-Generation Bomber program has existed in a classified form for a number of

²⁵ Douglas Barrie and Amy Butler, “Double Duty,” *Aviation Week & Space Technology*, April 28, 2008: 24.

The FY2006 budget submission anticipated entering the concept decision phase (i.e., starting an analysis of alternatives, or AOA for the program) in the first quarter of FY2006, and Milestone A approval, initiating technology development for the aircraft, in the fourth quarter of FY2008.

The FY2007 budget submission anticipated starting an AOA in the first quarter of FY2006 and finishing in the second quarter of FY2007; Milestone A approval, permitting the start of the technology development phase, in the second quarter of FY2007; and Milestone II approval, permitting the start of the system development and demonstration (SDD) phase, in the second quarter of FY2009.

The schedule in the FY2008 budget submission did not include any anticipated events beyond the end of FY2007.

The schedule in the FY2009 budget submission included one anticipated event beyond the end of FY2007—initiation in the first quarter of FY2008 of phase two of the Automated Aerial Refueling development effort. The FY2010 budget submission shows concept refinement on a next-generation long-range strike capability extending through the third quarter of FY2011, and the Automated Aerial Refueling phase two demonstration extending through the fourth quarter of FY2012.

²⁶ Bill Sweetman, “Northrop Grumman Appears To Have Landed Classified Next-Gen Bomber Prototype,” *Aerospace Daily & Defense Report*, May 28, 2009: 1-2.

²⁷ Marcus Weisgerber, “CSBA: USAF Next-Generation Bomber Program Could Cost \$40 Billion,” *Inside the Air Force*, February 6, 2009.

²⁸ See, for example, Douglas Barrie and Amy Butler, “Double Duty,” *Aviation Week & Space Technology*, April 28, 2008: 24, which states that “Funding for the bomber to date has been disbursed [sic] among various technology efforts.”

years, according to both Air Force and industry officials.”²⁹ An August 2008 press report stated that there was “a well-funded parallel demonstration program in place that is programmed for ‘multibillions of dollars’ over the next five years.”³⁰

Table 1. Funding For Next-Generation Bomber in PE0604015F

FY20045-FY2009, in millions of dollars, rounded to nearest tenth

FY2004	FY2005	FY2006	FY2007	FY2008	FY2009
44.2	28.9	24.1	37.5	7.0	0

Source: Prepared by CRS based on justification books for the Air Force research and development accounts for FY2010 and prior years.

Notes: Funding in FY2004 and FY2005 was added by Congress.

Projected Funding

Table 2 shows prior-year, requested, and projected funding for PE0604015F in the budget submissions for FY2005-FY2010.

Table 2. Planned Funding For PE0604015F In Budget Submissions

Budget submissions for FY2005 through FY2010, figures in millions of dollars, rounded to nearest tenth

	FY2005 budget	FY2006 budget	FY2007 budget	FY2008 budget	FY2009 budget	FY2010 budget
FY2004	44.6	44.2				
FY2005	0	29.7	28.9			
FY2006	0	25.1	24.8	24.1		
FY2007	0	69.8	25.6	25.5	37.5	
FY2008	190.0	182.8	64.5	0	0	7.0
FY2009		241.2	103.9	0	0	0
FY2010		326.9	305.7	0	0	0
FY2011			1,103.2	81.1	80.3	0
FY2012				101.1	100.1	0
FY2013				151.4	150.0	0
FY2014						0
FY2015						0
Cost to complete	590.0	440.1	“continuing”	“continuing”	“continuing”	“continuing”

²⁹ Marcus Weisgerber, “Air Force Unfunded List Includes a Classified \$140 Million Line for a New Bomber,” *InsideDefense.com (DefenseAlert – Daily News)*, June 5, 2009. A similar article was published as Marcus Weisgerber, “Schwartz: Air Force Needs To Keep Developing Bomber Technology,” *Inside the Air Force*, June 12, 2009. See also Marcus Weisgerber, “QDR Tiger Team To Study Air Force’s Long-Range Strike Mission,” *Inside the Air Force*, July 31, 2009.

³⁰ “Bomber Talk Quietened,” *Aerospace Daily & Defense Report*, August 4, 2008: 1.

Source: Prepared by CRS based on justification books for the Air Force research and development accounts for FY2005-FY2010.

Existing Bomber Fleet

The Air Force's existing bomber fleet includes 20 B-2 stealth bombers, 66 supersonic B-1B bombers, and 94 B-52H bombers. **Table 3** summarizes the three types of aircraft. Additional information on the existing bomber fleet presented in **Appendix A**.

Table 3. Current U.S. Air Force Bomber Fleet

	B-52H	B-1B	B-2
Number in inventory	94 (85 active/9 res)	66	20
Number combat ready	62 (54 active/8 res)	51	16
First Flight	1954	1984	1988
Last Delivery	1962	1988	1997
Range (nm) ^a	8,800	7,455	6,000+
Payload	70,000	75,000	40,000
Crew	5	4	2
Max Speed	Mach .86	Mach 1.2 (sea level)	"High Subsonic"

Source: Prepared by CRS based on Center for Strategic and International Studies Read-Ahead, "Long-Range Strike: Options and Alternatives," December 12, 2007, *Air Force Almanac*, May 2007, U.S. Air Force Fact Sheets.

a. Range noted is unrefueled "one-way" distances in nautical miles.

B-2 Spirit

The B-2 serves as both a conventional and nuclear bomber. The first B-2 was delivered in December 1993, and the aircraft achieved initial operational capability (IOC) in 1997. A total procurement of 132 B-2s was originally envisioned. Following the end of the Cold War, the figure was reduced to 75, and then to 20. Congress added one more by providing funding to convert one of the test vehicles into a combat aircraft, making for a total of 21, but a B-2 was lost in a crash during takeoff on Guam in February 2008, reducing the total back to 20. Of the Air Force's three current bomber types, the B-2 is the only one with all-aspect stealth characteristics. Its payload weight is more limited than those of the B-1 or B-52. The aircraft is expensive to operate, in part because of the maintenance requirements of its radar-absorbing skin.

B-1B Lancer

The B-1B achieved IOC in 1986. One hundred were built, of which 66 remain in service. The B-1B was designed to serve as an effective low-altitude supersonic bomber. The B-1B's speed and reduced front-aspect radar cross-section make it less vulnerable than the B-52 to attack by missiles and fighter aircraft. Following the end of the Cold War, the Air Force decided to focus the B-1B on the role of delivering conventional weapons. The Air Force initiated a Conventional Mission Upgrade Program (CMUP) to improve B-1 lethality and survivability in support of the conventional mission. CMUP provided the B-1B with systems that would allow the delivery of

the latest cluster bombs, Joint Direct Attack Munitions, and other precision-guided conventional weapons.

B-52H Stratofortress

The B-52 has been the workhorse of the Air Force manned bomber fleet for more than 50 years, during which time it has received numerous upgrades. Of the three current bomber types, the B-52 has the longest unrefueled loiter time and can carry the widest array of conventional and nuclear munitions. B-52 structural service life was examined and extended in 2007 from about 32,000 flight hours to about 39,000 flight hours,³¹ which Air Force officials expect will permit B-52s to remain in service until 2040. The potential disappearance of B-52 parts manufacturers over time could require close management of spare parts availability.³² Past bomber operational concepts have relegated the B-52 to the role of a standoff weapons carrier³³ and a vehicle for delivering massive firepower in low-threat areas. The Air Force's operational assessment is that the B-52 will not be survivable in higher-threat environments by 2015-2020.³⁴ Modernization of the B-52's electronic equipment is considered necessary to keeping the aircraft effective as a standoff weapons delivery vehicle.

Bomber Force Since End of Cold War

Roles and Missions

The bomber force during the Cold War was closely associated with the mission of strategic nuclear deterrence, in which bombers act as one leg of the U.S. strategic nuclear "triad," along with land-based intercontinental ballistic missiles (ICBMs) and submarine-launched ballistic missiles (SLBMs). During the Cold War, however, bombers also participated in conventional combat operations. They were used extensively, for example, for conventional bombing in the Vietnam war.

In the post-Cold War era, the bomber force retains its strategic nuclear mission, but participation in conventional combat operations has become more prominent. The bomber force in recent years has received upgrades intended to improve its ability to participate in conventional combat operations. In addition, the development of improved precision-guided munitions since the end of the Cold War permits bombers to conduct precision strikes, attack a larger number of targets per sortie, and more effectively support friendly ground forces.

In the 1999 the NATO bombing operation against Yugoslavia, all three U.S. bomber types saw action. During this operation, B-2s conducted their first combat missions, destroying 90% of the targets they engaged, and B-1s delivered almost 20% of the total tonnage of bombs while flying less than 2% of the total strike sorties.³⁵ In the first three weeks of the air campaign in

³¹ "Long-Range Strike White Paper," HQ USAF/A5RC, 2007, p. 6.

³² Axelso, Peter D., Major, "The B-52: Can It Fly Until 2050?" School of Advanced Airpower Studies, June 2000, p. 14.

³³ Standoff weapons are weapon systems capable of being launched or dropped from beyond the threat environment and using their own propulsion systems to carry themselves to the target.

³⁴ "Long-Range Strike White Paper," HQ USAF/A5RC, 2007, p. 13.

³⁵ Grant, Rebecca, *Return of the Bomber: The Future of Long-Range Strike*, Air Force Association Special Report, (continued...)

Afghanistan in 2001, bombers accounted for only 20% of the combat missions but dropped 76% of the bomb tonnage.³⁶ Among other operations, bombers operating over Afghanistan have attacked targets whose coordinates were provided by U.S. special operations forces personnel riding on horseback. In 2003, in the early stages of the war in Iraq, B-1s were in such demand that Central Command (CENTCOM) air component commander personally managed their scheduling.³⁷

Plans for Bomber Force Structure

Table 4 summarizes post-Cold War studies making recommendations on the numbers and types of bombers to be maintained in the future. For additional information on these studies, see **Appendix B**.

Table 4. Post-Cold War Studies For Bomber Force Structure

	Recommended Force Structure				Comments
	B-52H	B-1B	B-2A	Total	
1992 Air Force Bomber Roadmap	95	96	20	211	B-1 priority of focus
1993 DOD Bottom Up Review	(94)	(70)	(20)	184	100 bombers per regional conflict
1994 DOD Nuclear Posture Review	66	N/A	20	86^a	B-52H: -28 aircraft
1995 DOD Bomber Study	(66)	95	20	181	Recommends no more B-2s
1997 DOD QDR	71	95	21	187	B-52H: +5 aircraft
1999 Air Force White Paper	76	93	21	190	B-52H: +5 aircraft, B-1: -2 (crash)
2001 Air Force White Paper	76	60	21	157	B-1: -33 aircraft
2001 DOD QDR	n/a	n/a	n/a	n/a	112 combat-coded bombers
2002 DOD Nuclear Posture Review	76	N/A	21	97^a	97 bombers for nuclear mission
2006 DOD QDR	56	n/a	n/a	n/a	New bomber by 2018
2007 AF White Paper	76	67	21	164	

Notes: Prepared by CRS based on data in Bottom-Up Review , Quadrennial Defense Review (QDR), Nuclear Posture Review, and Air Force white papers on long-range strike. Numbers in parentheses were calculated from supplementary sources.

- a. Total aircraft numbers for the two Nuclear Posture Reviews do not include B-1B aircraft numbers because B-1Bs are no longer strategic nuclear weapons aircraft.

(...continued)

February 2007, p. 13.

³⁶ Rolfson, Bruce, "Bombers Shine in Air War but Remain Budget Targets," *Air Force Times*, November 26, 2001.

³⁷ Fulghum, David A. and Wall, Robert, "Baghdad Confidential," *Aviation Week*, April 28, 2003. Only 12 B-1s were available at the time for the war because a portion of the B-1 fleet was undergoing modification and others were on alert for other contingency support.

Prior-Year Legislative Activity

Prior-year legislative activity regarding the bomber forces includes, among other things, the following provisions:

- Section 133 of the FY1995 defense authorization act (S. 2182/P.L. 103-337 of October 5, 1994) required DOD to conduct a study on bomber force requirements, and reserved \$125 million from the Air Force's aircraft procurement account for an Enhanced Bomber Capability Fund. Section 134 of the act prohibited the Secretary of Defense from obligating or expending funding during FY1995 for retiring, or preparing to retire, any B-52Hs, B-1Bs, or F-111s.³⁸
- Section 1404 of the FY1996 defense authorization act (S. 1124/P.L. 104-106 of February 10, 1996) prohibited DOD from obligating or expending funding during FY1996 for retiring or dismantling, or for preparing to retire or dismantle, certain strategic nuclear delivery systems, including B-52Hs. Language in the conference report on the act authorized funding for retaining 28 B-52Hs in attrition reserve status.³⁹
- Section 1302 of the FY1998 defense authorization act (H.R. 1119/P.L. 105-85 of November 18, 1997) prohibited DOD from obligating or expending funding during FY1998 for retiring or dismantling, or for preparing to retire or dismantle, certain strategic nuclear delivery systems below the specified levels, including 71 B-52Hs, unless a START II treaty entered into force during FY1998.⁴⁰
- Section 1501 of the FY2000 defense authorization act (S. 1059/P.L. 106-65 of October 5, 1999) amended Section 1302 of the FY1998 defense authorization act to prohibit DOD from obligating or expending funding for retiring or dismantling, or for preparing to retire or dismantle, certain strategic nuclear delivery systems below the specified levels, including 76 B-52H bomber aircraft, unless certain conditions were met.⁴¹
- Section 131 of the FY2007 defense authorization act (H.R. 5122/P.L. 109-364 of October 17, 2006) prohibited the Secretary of the Air Force from retiring more than 18 B-52s, and required the Secretary to maintain 44 combat-coded B-52s, from the date of the bill's enactment until either January 1, 2018, or the date that a long-range strike replacement aircraft with equal or greater capability than the B-52H has attained initial operational capability status, whichever is earlier. The provision also prohibited DOD from obligating or expending funding for retiring

³⁸ The F-111 was a medium-range bomber that is no longer in U.S. service.

³⁹ H.Rept. 104-450 of January 22, 1996, page 868-869. The allowance to place 28 B-52Hs in attrition reserve matched the 1994 DOD Nuclear Posture Review's stated requirement of 66 operational B-52Hs. Congress's intent was to ensure that all 94 B-52Hs received standard maintenance and scheduled upgrades, while allowing the Air Force to focus training and operations on 66 operational B-52Hs.

⁴⁰ This provision was consistent with an Air Force analysis in 1996 of the recommendations in the 1994 Nuclear Posture Review's bomber force requirements, which concluded that the Air Force would need more than 66 B-52Hs in order to maintain 56 bombers in "mission-ready" status.

⁴¹ This provision was consistent with the force structure called for in the 2001 Air Force Long-Range Strike White Paper, while leaving the remaining 18 B-52Hs to be kept in attrition reserve status.

any of the 93 B-52Hs until 45 days after the date on which the Secretary of the Air Force submitted a report on bomber force structure.⁴²

- Section 137 of the FY2008 defense authorization act (H.R. 4986/P.L. 110-181 of January 28, 2008) amended Section 131 of the FY2007 defense authorization act to require a primary aircraft inventory of not less than 63 B-52s, a backup aircraft inventory of not less than 11, and an attrition reserve aircraft inventory of not less than two such aircraft.⁴³
- Section 357 of the FY2009 defense authorization act (S. 3001/P.L. 110-417 of October 14, 2008) further amended Section 131 of the FY2007 defense authorization act to permit four (rather than two) B-52s to be used for ground maintenance training.

Issues for Congress

A key issue for Congress in FY2010 is whether to provide funding in FY2010 for a next-generation bomber program. A second issue is whether to enact legislation that would amend or add to prior-year legislation on bomber force structure. In considering these issues, Congress may take various factors into account, including the following:

- the future roles and missions of bombers for strategic nuclear deterrence, conventional conflicts, and irregular warfare;
- the ability of the current bomber force to perform those roles and missions cost effectively, and for how long;
- the potential effect of the timing of a next-generation bomber program on the potential design and capabilities of the new bomber; and
- the potential effect of decisions on a next-generation bomber program on any skills that are unique to designing and constructing bombers.

Each of these factors is discussed briefly below.

⁴² This provision appears to have been prompted by the intention announced in the final report on the 2006 QDR to retire 38 B-52Hs.

⁴³ The conference report on the FY2009 defense authorization act stated:

The conferees believe that a B-52 total aircraft inventory of less than 76 aircraft is not sufficient to meet combatant commander requirements for conventional, long-range strike requirements if the need should arise to conduct near simultaneous operations in two major regional conflicts. The conferees strongly discourage the Secretary of the Air Force from taking action to reduce the B-52 aircraft inventory below 76 total aircraft prior to the next generation bomber reaching initial operational capability status and strongly oppose a strategy that reduces current conventional long-range strike capability. (H.Rept. 110-477 on H.R. 1585 of December 6, 2007, page 745. H.R. 1585 was vetoed by the President on December 28, 2007. H.R. 4986 was subsequently passed by Congress, and H.Rept. 110-477 effectively serves as the conference report for the parts of H.R. 4986 that were not changed from H.R. 1585.)

Future Roles and Missions of Bombers

Future roles and missions of bombers are being discussed as part of 2010 QDR and the associated Nuclear Posture Review (NPR). A key issue in the QDR is the numbers and types of potential future conflicts for which U.S. military forces should prepare. On July 9, 2009, U.S. Marine Corps General James Cartwright, the Vice Chairman of the Joint Chiefs of Staff, testified to the Senate Armed Services Committee as part of a discussion on the required number of F-22 fighters that a U.S. military strategy emerging in the QDR focuses on preparing for future conflicts similar to those in Iraq and Afghanistan while also having forces sufficient to fight a single major regional peer competitor. Such a strategy, he said, would be in contrast to the defense-planning standard first established in the early 1990s, following the end of the Cold War, of having forces sufficient to fight two nearly simultaneous major regional conflicts.⁴⁴

Some analysts, such as those at the Center for Strategic and Budgetary Assessments (CSBA), argue that in light of the recent or projected fielding by potential adversaries of anti-access systems,⁴⁵ the United States should pursue options for operating more effectively outside the range of such systems, including reducing planned funding for acquisition of shorter-ranged tactical aircraft (i.e., fighters and strike fighters), and increasing planned funding for the acquisition of longer-ranged aircraft, including bombers.⁴⁶

If arms control negotiations with Russia lead to an agreement to reduce U.S. nuclear forces from currently planned levels, that could, other things held equal, lead to a reduction in the number of bombers required for the mission of strategic nuclear deterrence. It is possible, however, that the number of bombers required for conventional operations might exceed the number required for strategic nuclear deterrence. Another factor to consider is how the designs of bombers work with the counting rules used in strategic arms control agreements. An April 23, 2009, press report stated:

⁴⁴ A July 9, 2009 press report on Cartwright's testimony stated:

The Defense Department has completed a new analysis that affirms a requirement for 187 F-22A fighters, the vice chairman of the Joint Chiefs of Staff said today—a finding he said fits with a developing war-planning strategy that assumes the U.S. military must be prepared to fight one major theater war at a time....

The military requirement right now [for the F-22A] is associated with the strategy that we are laying out in the Quadrennial Defense Review," Cartwright said. "And it is a departure from the two-major-theater-war construct that we have adhered to in the past and in which this aircraft grew up.

The strategy that we are moving towards is one that is acknowledging ... that the more likely conflicts are going to be similar to the ones we're in Iraq and Afghanistan," he said. "But [also] that we do need to have a capability against a major peer competitor and that we believe that the sizing construct demands that we have fifth-generation fighters across all services rather than just one.

And that the numbers of those fighters probably does not need to be sufficient to take on two nearly simultaneous peer competitors. We don't see that as the likely, we see that as the extreme.

(Jason Sherman, "Cartwright: New Tactical Air Assessment, War-Planning Strategy Affirm Need For 187 F-22As," *InsideDefense.com* (*DefenseAlert – Daily News*), July 9, 2009. Bracketed material as in the original. The article was reprinted in the July 10, 2009, issue of sister publication *Inside the Air Force* under the title "Cartwright: Tacair Study, Military Strategy Affirm Need For 187 F-22As.")

⁴⁵ Anti-access systems are military systems (such as fighters, surface-to-air missiles, and supporting long-range surveillance systems) that are intended to deny opposing military forces access to areas near those potential adversaries.

⁴⁶ See, for example, John M. Doyle, "Analyst Urges Moving Forward On Next Generation Bomber," *Aerospace Daily & Defense Report*, February 4, 2009: 5; and Jason Sherman, "Krepinevich: Cut Investments in JSF, EFV and Other 'Wasting Assets,'" *Inside the Air Force*, July 10, 2009.

The Russians are looking at bombers, and the counting rules for bombers are pretty onerous,” [Lieutenant General Robert] Elder [commander of the 8th Air Force,] says. “One of the issues is that they count the number of warheads that a bomber is capable of carrying, not its operational load-out. For example, the B-52 is counted as carrying more weapons than it does operationally. That [bomber design] is inefficient for negotiations.⁴⁷

Ability of Current Bomber Force to Perform Future Roles and Missions

The ability of the current bomber force to perform future bomber roles and missions cost effectively, and for how long, will be affected by the feasibility and cost effectiveness of programs for modernizing current bombers and perhaps also programs for extending the service lives of current bombers and/or the air-launched cruise missiles (ALCMs) currently carried by the B-52Hs. For additional information on programs for modernizing current bombers, see **Appendix A**. As mentioned earlier (see “Comments”), the Air Force states that the ALCM inventory has undergone a Service Life Extension Program (SLEP) to permit it to remain in service until at least 2020, and that there is a possibility its service life could be extended further, to 2030. Although Air Force officials expect that the B-52s themselves can remain in service to 2040, one question is how costs and capabilities, and thus overall cost effectiveness, of keeping the B-52s in service to that date might compare with the option of building a new bomber that would enter service prior to that date.

Effect of Timing on Potential Design of a New Bomber

Deferring the start of a next-generation bomber program could provide time to mature new technologies that might affect the design of the new bomber, such as unmanned aircraft or hypersonic propulsion technologies. Advocates of deferring start of a next-generation bomber might argue, among other things, that it would permit the bomber to be designed as an unmanned platform, which could reduce its procurement cost by eliminating features designed to support human occupants. Opponents of deferring the start of a next-generation bomber program might argue, among other things, that it would be prudent to design the next-generation bomber as an aircraft that can be either manned or unmanned, as future operational needs dictate, and that if that is the case, the bomber can be designed and built now as a manned aircraft and then modified later into an aircraft that can be operated as either a manned or unmanned aircraft.

Bomber Design and Construction Skills

Regarding skills that may be unique to designing and constructing bombers, a June 2009 press report stated:

When asked about industrial base, [Secretary of the Air Force] Donley said he is focused on key areas that need attention, especially in light of proposed program terminations in the fiscal 2010 budget request from the Pentagon.

⁴⁷ David A. Fulghum, “USAF Bomber Grounded By More Than Budget: 8th AF Chief,” *Aerospace Daily & Defense Report*, April 23, 2009: 5. The bracketed term “[bomber design]” is as in the original; the other bracketed parts, relating to Elder’s rank, name, and position, were inserted by CRS.

He singled out the work forces for long-range strike and secure satellite communications; work on a next-generation long-range bomber that was sidelined pending a Nuclear Posture Review and the Quadrennial Defense Review, while the Transformational Satellite program—a competition between Boeing and Lockheed Martin—was dashed in favor of more purchases of systems that are either fielded or already in development. He did not cite how much money could be allocated to bolstering these areas. One senior defense official said as much as \$140 million could be needed to hold together design teams for a new bomber.⁴⁸

A July 2009 press report stated:

The most prominent lobbying association for U.S. aerospace and defense firms is advocating for industrial base considerations to be included in the Pentagon's forthcoming Quadrennial Defense Review (QDR), which will outline a strategic framework for the Defense Department for the next four years.

Past QDRs have not taken into account the consequences of its findings on the defense industrial base. This year's QDR is already under way and will be complete by October. Industry was alarmed when Defense Secretary Robert Gates said his fiscal 2010 budget—which included several program terminations, deferments and production line closures—did not take into account the effect on the industrial base.

Aerospace Industries Association (AIA) officials say several niche areas of the industrial base are in trouble now, and other sectors are at risk depending potentially on the outcome of the QDR. AIA's report highlights what the group sees as a growing divide between top executives in aerospace and defense companies and Pentagon leadership.

"I am concerned that this partnership has been weakening and that our very success has led defense planners to take industrial capability as a given," says Marion Blakey, AIA president and CEO.

Although the Pentagon says it relies on market forces to maintain a healthy industrial base, defense-unique technologies such as integrated avionics, low-observables and highly complex computer processors must be nurtured to avoid atrophy, AIA says. Once lost, AIA officials warn, rebuilding the skills for designing, producing and sustaining defense-unique capabilities is difficult, expensive and time-consuming.

AIA is advocating what Blakey calls a "deliberate" process that takes into account the industrial consequences of actions. An example is the effect of not pursuing a new long-range bomber on the industrial base and its future capacity to design, produce and sustain one.

"Knowing [the consequences] upfront is, in our view, essential," says Fred Downey, vice president of AIA's national security division....

Some sectors already in trouble include rotary-wing, long-range strike, space and science and technology, Downey says.⁴⁹

⁴⁸ Amy Butler, "Donley Focuses On International Cooperation, Industrial Base Issues," *Aerospace Daily & Defense Report*, June 17, 2009: 1-2.

⁴⁹ Amy Butler, "AIA Pushes For QDR To Consider Industrial Base," *Aerospace Daily & Defense Report*, July 14, 2009: 1-2.

Legislative Activity for FY2010

FY2010 Funding Request

The Air Force's research and development account includes a line item—Program Element (PE) 0604015F, Next Generation Long Range Strike (NGLRS)—that since the FY2005 budget submission has included funded explicitly identified as being for development of a next-generation bomber. The Administration's proposed FY2010 defense budget requests no funding for this line item for FY2010-FY2015.

FY2010 Defense Authorization Bill (H.R. 2647/S. 1390)

House

The House Armed Services Committee, in its report (H.Rept. 111-166 of June 18, 2009) on H.R. 2647, recommends authorizing no FY2010 funding in PE0604015F for development of a next-generation bomber. (Page 188, line 50) The report recommends \$215 million in additional funding in the Air Force research and development account for a line item identified as "Other Programs" (page 198, line 999), but it is not clear whether any of this funding is related to a next-generation bomber. The FY2010 funding request for this line item was \$11.96 billion, suggesting that this line item might fund a variety of classified research and development projects. A June 26, 2009, press report stated:

The decision by U.S. House defense overseers to authorize continued funding for Next Generation Bomber studies has buoyed the hopes of Senate bomber advocates, even though Defense Secretary Robert Gates wants to wait before spending more....

The House Armed Services Committee (HASC) included \$215 million for additional, classified Air Force R&D in the fiscal 2010 defense authorization bill. That Air Force R&D is believed to contain the bomber project.

"The question in the House revolves more around the advanced technology associated with the bomber," said Rep. Neil Abercrombie (D-Hawaii), chair of the House airland subcommittee.

Because of the classified nature of the information, Abercrombie said he couldn't go into detail, but he noted there is general agreement in the House—particularly the HASC—about pursuing R&D associated with the new bomber. He said there was interest in "increased stealth capabilities" but would go no further than that.⁵⁰

Section 1032 of H.R. 2647 would require the Secretary of Defense to submit a report to the congressional defense committees on the force structure findings of the QDR, including a discussion of bombers. Regarding this section, the House Armed Services Committee's report states:

⁵⁰ John M. Doyle, "Lawmakers Restore Money To Continue Study Of Next Bomber," *Aerospace Daily & Defense Report*, June 26, 2009: 5.

The committee expects that the analyses submitted will include details on all elements of the force structure discussed in the QDR report, and particularly the following:...

(4) A description of the factors that informed decisions regarding bomber force structure, including: the modeling, simulations, and analyses used to determine the number and type of bomber aircraft necessary to meet the national defense strategy; the force sizing constructs used including peak demand; the number and type of bomber aircraft necessary to meet the national defense strategy; and the operational risks associated with the planned bomber aircraft fleet, based on requirements of combatant commanders, and measures planned to address those risks;... (Page 388)

Senate

Division D of S. 1390 as reported by the Senate Armed Services Committee (S.Rept. 111-35 of July 2, 2009) presents the detailed line-item funding tables that in previous years have been included in the Senate Armed Services Committee's report on the defense authorization bill. Division D recommends authorizing no FY2010 funding in PE0604015F for development of a next-generation bomber. (Page 685 of the printed bill, line 50) Division D recommends \$140 million in additional funding in the Air Force research and development account for a line item identified as "Other Programs" (page 692 of the printed bill, line 999), but it is not clear whether any of this funding is related to a next-generation bomber. The FY2010 funding request for this line item was \$11.96 billion, suggesting that this line item might fund a variety of classified research and development projects.

Section 124 of S. 1390 makes a series of findings regarding long-range strike capability and bombers, and would make it U.S. policy to support a development program for next-generation bomber aircraft technologies. The text of the provision is as follows:

SEC. 124. NEXT GENERATION BOMBER AIRCRAFT.

(a) Findings- Congress makes the following findings:

(1) Long-range strike is a critical mission in which the United States needs to retain a credible and dominant capability.

(2) Long range, penetrating strike systems provide—

(A) a hedge against being unable to obtain access to forward bases for political reasons;

(B) a capacity to respond quickly to contingencies;

(C) the ability to base outside the reach of emerging adversary anti-access and area-denial capabilities; and

(D) the ability to impose disproportionate defensive costs on prospective adversaries of the United States.

(3) The 2006 Quadrennial Defense Review found that there was a requirement for a next generation bomber aircraft and directed the United States Air Force to 'develop a new land-based, penetrating long range strike capability to be fielded by 2018'.

(4) On April 6, 2009, Secretary Gates announced that the United States 'will not pursue a development program for a follow-on Air Force bomber until we have a better understanding of the need, the requirement and the technology'.

(5) On May 7, 2009, President Barack Obama announced the termination of the next generation bomber aircraft program in the document of the Office of Management and Budget entitled 'Terminations, Reductions, and Savings', stating that 'there is no urgent need to begin an expensive development program for a new bomber' and that 'the future bomber fleet may not be affordable over the next six years'.

(6) The United States will need a new long-range strike capability because the conflicts of the future will likely feature heavily defended airspace, due in large part to the proliferation of relatively inexpensive, but sophisticated and deadly, air defense systems.

(7) General Michael Maples, the Director of the Defense Intelligence Agency, noted during a March 10, 2009, hearing of the Committee on Armed Services of the Senate on worldwide threats that 'Russia, quite frankly, is the developer of most of those [advanced air defense] systems and is exporting those systems both to China and to other countries in the world'.

(8) The Final Report of the Congressional Commission on the Strategic Posture of the United States, submitted to Congress on May 6, 2009, states that '[t]he bomber force is valuable particularly for extending deterrence in time of crisis, as their deployment is visible and signals U.S. commitment. Bombers also impose a significant cost burden on potential adversaries in terms of the need to invest in advanced air defenses'.

(9) The commanders of the United States Pacific Command, the United States Strategic Command, and the United States Joint Forces Command have each testified before the Committee on Armed Services of the Senate in support of the capability that the next generation bomber aircraft would provide.

(10) On June 17, 2009, General James Cartwright, Vice-Chairman of the Joint Chiefs of Staff and chair of the Joint Requirements Oversight Council, stated during a hearing before the Committee on Armed Services of the Senate that 'the nation needs a new bomber'.

(11) Nearly half of the United States bomber aircraft inventory (47 percent) pre-dates the Cuban Missile Crisis.

(12) The only air-breathing strike platforms the United States possesses today with reach and survivability to have a chance of successfully executing missions more than 1,000 nautical miles into enemy territory from the last air-to-air refueling are 16 combat ready B-2 bomber aircraft.

(13) The B-2 bomber aircraft was designed in the 1980s and achieved initial operational capability over a decade ago.

(14) The crash of an operational B-2 bomber aircraft during takeoff at Guam in early 2008 indicates that attrition can and does occur even in peacetime.

(15) The primary mission requirement of the next generation bomber aircraft is the ability to strike targets anywhere on the globe with whatever weapons the contingency requires.

(16) The requisite aerodynamic, structural, and low-observable technologies to develop the next generation bomber aircraft already exist in fifth-generation fighter aircraft.

(b) Policy on Continued Development of Next Generation Bomber Aircraft in Fiscal Year 2010- It is the policy of the United States to support a development program for next generation bomber aircraft technologies.

Regarding Section 124, the committee's report states:

On April 6, 2009, Secretary Gates announced that the United States “will not pursue a development program for a follow-on Air Force bomber until we have a better understanding of the need, the requirement, and technology.” Subsequent to this announcement, commanders of the United States Strategic Command, the United States Pacific Command, and the United States Joint Forces Command all testified before the committee that the capability that a next-generation bomber would provide will be needed in the future.

The committee understands that discussion on a next-generation bomber will occur in the context of the Quadrennial Defense Review and the Nuclear Posture Review, which will inform the fiscal year 2011 budget deliberations. (Pages 15-16)

The committee's report presents the additional views of Senator John Thune regarding Section 124 on pages 326-329. Senator Thune states in these views that Section 124 is based on S. 1044 (see below).

Preserving Future United States Capability to Project Power Globally Act of 2009 (S. 1044)

S. 1044 was introduced on May 14, 2009. Section 2 of the bill makes a series of findings regarding long-range strike capability and bombers. Section 3 states:

It is the policy of the United States—

(1) to pursue a development program for the next generation bomber during fiscal year 2010, in accordance with the guidance established in the 2006 Quadrennial Defense Review, including the full authorization and appropriation of appropriate funds; and

(2) not to delay the next generation bomber development program by deliberations on the 2010 Quadrennial Defense Review, deliberations on the Nuclear Posture Review, or negotiations over the follow-on Strategic Arms Reduction Treaty (START).

Appendix A. Existing Bomber Fleet

This appendix presents additional information on the Air Force's existing fleet of B-2, B-1B, and B-52H bombers.

B-2 Bomber

May 2009 Air Force Testimony

The Air Force testified in May 2009 that:

The B-2 Spirit Advanced Technology Bomber provides a lethal combination of stealth, range, payload, and precision engagement. The B-2 remains the world's sole long-range, low observable bomber, and the only platform capable of delivering 80 independently targeted GBU-38s.

B-2 availability has steadily increased over the past five years, due in large part to focused efforts to enhance low observable maintenance such as the highly successful Alternate High Frequency Material program. However, it still faces increasing pressures to upgrade avionics originally designed over twenty years ago. The three-increment Extremely High Frequency Satellite Communications and Computer Upgrade program (EHF SATCOM and Computer Upgrade) seeks first, in Increment 1, to upgrade the Spirit's flight management computers as an enabler for future avionics efforts. Increment 2 integrates the Family of Beyond-line-of-sight Terminals (FAB-T) along with a low observable antenna to provide secure, survivable strategic two-way communications, while Increment 3 will connect the B-2 into the Global Information Grid. Increment 1 of EHF SATCOM and Computer Upgrade is currently in Engineering and Manufacturing Development (EMD) and on track to begin procurement in FY11 for fleet installation beginning at the end of FY13.

The B-2 is also replacing the original radar antenna and upgrading selected radar avionics as part of the Radar Modernization Program (RMP) to change the radar operating frequency. RMP recently recovered from development challenges and has been approved to enter production. The LRIP contract for the first six production radar kits was signed on 29 December 2008, with the second and final buy for the remaining seven shipsets slated for later this year. Seven radar shipsets were also bought during development and are currently being installed in fleet aircraft to round out the 20 aircraft B-2 fleet; the developmental units will be retrofitted to the final production configuration. Thanks in large part to Congressional support, the RMP acquisition strategy was modified to include both life-of-type component buys to avoid diminishing manufacturing issues during the production run, and advance procurement to recover five months of the schedule lost while resolving the RMP integration issues during development.⁵¹

⁵¹ Department of the Air Force Presentation to the House Armed Services Committee Subcommittee on Air and Land Forces, United States House of Representatives, Subject: Air Force Programs, Combined Statement of: Lieutenant General Daniel J. Darnell, Air Force Deputy Chief Of Staff For Air, Space and Information Operations, Plans And Requirements (AF/A3/5), Lieutenant General Mark D. Shackelford, Military Deputy, Office of the Assistant Secretary of the Air Force for Acquisition (SAF/AQ), Lieutenant General Raymond E. Johns, Jr., Air Force Deputy Chief of Staff for Strategic Plans And Programs (AF/A8), May 20, 2009, pp. 14-15.

March 2009 GAO Report

A March 2009 GAO report provides summary assessments of the B-2 Radar Modernization Program (RMP) and the B-2 Advanced Extremely High Frequency (EHF) SATCOM modernization program.⁵²

Air Force Fact Sheet

An online Air Force Fact Sheet on the B-2 bomber dated April 2008 stated the following:

Mission

The B-2 Spirit is a multi-role bomber capable of delivering both conventional and nuclear munitions. A dramatic leap forward in technology, the bomber represents a major milestone in the U.S. bomber modernization program. The B-2 brings massive firepower to bear, in a short time, anywhere on the globe through previously impenetrable defenses.

Features

Along with the B-52 and B-1B, the B-2 provides the penetrating flexibility and effectiveness inherent in manned bombers. Its low-observable, or “stealth,” characteristics give it the unique ability to penetrate an enemy's most sophisticated defenses and threaten its most valued, and heavily defended, targets. Its capability to penetrate air defenses and threaten effective retaliation provides a strong, effective deterrent and combat force well into the 21st century.

The revolutionary blending of low-observable technologies with high aerodynamic efficiency and large payload gives the B-2 important advantages over existing bombers. Its low-observability provides it greater freedom of action at high altitudes, thus increasing its range and a better field of view for the aircraft's sensors. Its unrefueled range is approximately 6,000 nautical miles (9,600 kilometers).

The B-2's low observability is derived from a combination of reduced infrared, acoustic, electromagnetic, visual and radar signatures. These signatures make it difficult for the sophisticated defensive systems to detect, track and engage the B-2. Many aspects of the low-observability process remain classified; however, the B-2's composite materials, special coatings and flying-wing design all contribute to its “stealthiness.”

The B-2 has a crew of two pilots, a pilot in the left seat and mission commander in the right, compared to the B-1B's crew of four and the B-52's crew of five.

Background

The first B-2 was publicly displayed on Nov. 22, 1988, when it was rolled out of its hangar at Air Force Plant 42, Palmdale, Calif. Its first flight was July 17, 1989. The B-2 Combined Test Force, Air Force Flight Test Center, Edwards Air Force Base, Calif., is responsible for flight testing the engineering, manufacturing and development aircraft on the B-2.

⁵² Government Accountability Office, *Defense Acquisitions[:] Assessments of Selected Weapon Programs*, GAO-09-326SP, March 2009, pp. 37-40.

Whiteman AFB, Mo., is the only operational base for the B-2. The first aircraft, Spirit of Missouri, was delivered Dec. 17, 1993. Depot maintenance responsibility for the B-2 is performed by Air Force contractor support and is managed at the Oklahoma City Air Logistics Center at Tinker AFB, Okla.

The combat effectiveness of the B-2 was proved in Operation Allied Force, where it was responsible for destroying 33 percent of all Serbian targets in the first eight weeks, by flying nonstop to Kosovo from its home base in Missouri and back. In support of Operation Enduring Freedom, the B-2 flew one of its longest missions to date from Whiteman to Afghanistan and back. The B-2 completed its first-ever combat deployment in support of Operation Iraqi Freedom, flying 22 sorties from a forward operating location as well as 27 sorties from Whiteman AFB and releasing more than 1.5 million pounds of munitions. The B-2's proven combat performance led to declaration of full operational capability in December 2003.

The prime contractor, responsible for overall system design and integration, is Northrop Grumman Integrated Systems Sector. Boeing Military Airplanes Co., Hughes Radar Systems Group, General Electric Aircraft Engine Group and Vought Aircraft Industries, Inc., are key members of the aircraft contractor team.

General Characteristics

Primary function: Multi-role heavy bomber

Contractor: Northrop Grumman Corp. and Contractor Team: Boeing Military Airplanes Co., Hughes Radar Systems Group, General Electric Aircraft Engine Group and Vought Aircraft Industries, Inc.

Power Plant: Four General Electric F118-GE-100 engines

Thrust: 17,300 pounds each engine

Wingspan: 172 feet (52.12 meters)

Length: 69 feet (20.9 meters)

Height: 17 feet (5.1 meters)

Weight: 160,000 pounds (72,575 kilograms)

Maximum Takeoff Weight: 336,500 pounds (152,634 kilograms)

Fuel Capacity: 167,000 pounds (75,750 kilograms)

Payload: 40,000 pounds (18,144 kilograms)

Speed: High subsonic

Range: Intercontinental

Ceiling: 50,000 feet (15,240 meters)

Armament: Conventional or nuclear weapons

Crew: Two pilots

Unit cost: Approximately \$1.157 billion (fiscal 98 constant dollars)

Initial operating capability: April 1997

Inventory: Active force: 20 (1 test); ANG: 0; Reserve: 0⁵³

B-1B Bomber

May 2009 Air Force Testimony

The Air Force testified in May 2009 that:

The B-1 provides the Joint Force Commander massive firepower potential coupled with a significant loiter capability perfectly suited for the inconsistent tempo of today's ongoing operations. Added to this is the B-1's unique supersonic dash potential which allows a single aircraft to perform as a roving linebacker over large portions of the overall AOR. Once solely a nuclear deterrent, the Air Force has re-focused the B-1's capabilities through modernizing its current conventional lethality.

A perfect example of the B-1's potential was realized by adding an Advanced Targeting Pod to the platform's sensor suite. In an exceptional display of acquisition effectiveness, in 2007 the Air Force and our corporate partners responded to AFCENT's highest Urgent Operational Need requirement by energizing a fast-track development and procurement timeline. With the help of supplemental funding, by June 2008 the 34th Bomb Squadron from Ellsworth AFB, South Dakota was able to deploy a full complement of Sniper-equipped B-1 bombers to support both OEF and OIF operations without a single break in daily combat operations. The program continues in 2009 to outfit the remaining fleet and incorporate laser-guided weapons as well as integrating pod data directly into the avionics system, allowing for direct machine-to-machine transfer of targeting data. As stated by the Combined Force Air Component Commander, "The Sniper pod on the B-1 Bomber is amazing."

This new capability means the B-1 is even more in demand for current operational taskings. The non-stop overseas contingency operations are taking a toll on the overall fleet. Currently in FY09, the Air Force is addressing five different issues which would have meant potentially grounding aircraft if they were not addressed. As a baseline to many of these sustainment modifications, the Air Force also embarked on its largest cockpit and communications modernization for the B-1 since its inception. Begun in 2005, the B-1 Fully Integrated Data Link (FIDL) program infuses a tactical Link-16 data link and a Joint Range Extension (JRE) Beyond Line of Sight (BLOS) data link into an entirely overhauled modern cockpit. This system of modifications removes legacy monochrome displays and incorporates a series of color multifunction displays capable of displaying a wide array of fused data at all crew stations. Although the B-1 FIDL program has suffered several setbacks, through the continued persistence of Air Force and Congressional support the program is now turning the corner and progressing toward completion. This upgrade will not

⁵³ U.S. Air Force fact sheet on the B-2, available online at <http://www.af.mil/information/factsheets/factsheet.asp?fsID=82>.

only help protect the B-1 parts from obsolescence, it will evolve an already capable conventional platform into a networked provider of precision firepower.⁵⁴

Air Force Fact Sheet

An online Air Force Fact Sheet on the B-1B bomber dated May 2009 stated the following:

Mission

Carrying the largest payload of both guided and unguided weapons in the Air Force inventory, the multi-mission B-1 is the backbone of America's long-range bomber force. It can rapidly deliver massive quantities of precision and non-precision weapons against any adversary, anywhere in the world, at any time.

Features

The B-1B's blended wing/body configuration, variable-geometry wings and turbofan afterburning engines, combine to provide long range, maneuverability and high speed while enhancing survivability. Forward wing settings are used for takeoff, landings, air refueling and in some high-altitude weapons employment scenarios. Aft wing sweep settings - the main combat configuration—are typically used during high subsonic and supersonic flight, enhancing the B-1B's maneuverability in the low- and high-altitude regimes. The B-1B's speed and superior handling characteristics allow it to seamlessly integrate in mixed force packages. These capabilities, when combined with its substantial payload, excellent radar targeting system, long loiter time and survivability, make the B-1B a key element of any joint/composite strike force. The B-1 weapon system is capable of creating a multitude of far-reaching effects across the battlefield.

The B-1 is a highly versatile, multi-mission weapon system. The B-1B's offensive avionics system includes high-resolution synthetic aperture radar, capable of tracking, targeting and engaging moving vehicles as well as self-targeting and terrain-following modes. In addition, an extremely accurate Global Positioning System-aided Inertial Navigation System enable aircrews to autonomously navigate globally, without the aid of ground-based navigation aids as well as engage targets with a high level of precision. The recent addition of Combat Track II radios permit an interim secure beyond line of sight reach back connectivity until Link-16 is integrated on the aircraft. In a time sensitive targeting environment, the aircrew can receive targeting data from the Combined Air Operations Center over CT II, then update mission data in the offensive avionics system to strike emerging targets rapidly and efficiently. This capability was effectively demonstrated during operations Enduring Freedom and Iraqi Freedom.

The B-1B's self-protection electronic jamming equipment, radar warning receiver (ALQ-161) and expendable countermeasures (chaff and flare) system complements its low-radar cross-section to form an integrated, robust onboard defense system that supports penetration of hostile airspace. The ALQ-161 electronic countermeasures system detects and identifies the full spectrum of adversary threat emitters then applies the appropriate jamming technique

⁵⁴ Department of the Air Force Presentation to the House Armed Services Committee Subcommittee on Air and Land Forces, United States House of Representatives, Subject: Air Force Programs, Combined Statement of: Lieutenant General Daniel J. Darnell, Air Force Deputy Chief Of Staff For Air, Space and Information Operations, Plans And Requirements (AF/A3/5), Lieutenant General Mark D. Shackelford, Military Deputy, Office of the Assistant Secretary of the Air Force for Acquisition (SAF/AQ), Lieutenant General Raymond E. Johns, Jr., Air Force Deputy Chief of Staff for Strategic Plans And Programs (AF/A8), May 20, 2009, pp. 13-14.

either automatically or through operator manual inputs. Chaff and flares are employed against radar and infrared threat systems.

B-1 capabilities are being enhanced through the completion of the Conventional Mission Upgrade Program. This program has already improved lethality by adding the ability to carry up to 30 cluster munitions (CBU-87, -89, -97), a Global Positioning System receiver, an improved weapons interface that allows the carriage of Joint Direct Attack Munitions guided weapons and advanced secure radios (ARC-210). Survivability is enhanced through the addition of the ALE-50 Towed Decoy System which decoys advanced radar guided surface-to-air and air-to-air missile systems.

The CMUP adds improved avionics computers which allow the employment of additional advanced guided precision and non-precision weapons: 30 Wind-Corrected Munitions Dispensers (CBU-103, -104, -105 WCMD), 12 AGM-154 Joint Standoff Weapons or 24 AGM-158 Joint Air-to-Surface Standoff Missile. The B-1 will be able to carry and employ any mix of these weapons (a different type of weapon in each of the three weapons bays). The B-1 will also be the first platform to carry the extended range version of the JASSM. These modifications significantly increase B-1 combat capability.

Future planned modifications build on this foundation provided by the new avionics computers. Radar sustainability and capability upgrades will provide a more reliable system in addition to an ultra high-resolution capability that may include automatic target recognition features. The addition of Link-16 will allow the B-1 to operate in the integrated battlefield of the future. Cockpit modifications will relieve reliability problems and increase aircrew situational awareness and provide an integrated flow of information.

Background

The B-1A was initially developed in the 1970s as a replacement for the B-52. Four prototypes of this long-range, high speed (Mach 2.2) strategic bomber were developed and tested in the mid-1970s, but the program was canceled in 1977 before going into production. Flight testing continued through 1981.

The B-1B is an improved variant initiated by the Reagan administration in 1981. Major changes included the addition of additional structure to increase payload by 74,000 pounds, an improved radar and reduction of the radar cross section by an order of magnitude. The inlet was extensively modified as part of this RCS reduction, necessitating a reduction in maximum speed to Mach 1.2.

The first production B-1 flew in October 1984, and the first B-1B was delivered to Dyess Air Force Base, Texas, in June 1985. Initial operational capability was achieved on Oct. 1, 1986. The final B-1B was delivered May 2, 1988.

The B-1B holds almost 50 world records for speed, payload, range, and time of climb in its class. The National Aeronautic Association recognized the B-1B for completing one of the 10 most memorable record flights for 1994. The most recent records were made official in 2004.

The B-1B was first used in combat in support of operations against Iraq during Operation Desert Fox in December 1998. In 1999, six B-1s were used in Operation Allied Force, delivering more than 20 percent of the total ordnance while flying less than 2 percent of the combat sorties. Eight B-1s were deployed in support of Operation Enduring Freedom. B-1s dropped nearly 40 percent of the total tonnage during the first six months of OEF. This included nearly 3,900 JDAMs, or 67 percent of the total. All of this was accomplished while maintaining an impressive 79 percent mission capable rate.

General Characteristics

Primary Function: Long-range, multi-role, heavy bomber

Contractor: Boeing, North America (formerly Rockwell International, North American Aircraft); Offensive avionics, Boeing Military Airplane; defensive avionics, EDO Corporation

Power plant: Four General Electric F101-GE-102 turbofan engine with afterburner

Thrust: 30,000-plus pounds with afterburner, per engine

Wingspan: 137 feet (41.8 meters) extended forward, 79 feet (24.1 meters) swept aft

Length: 146 feet (44.5 meters)

Height: 34 feet (10.4 meters)

Weight: approximately 190,000 pounds (86,183 kilograms)

Maximum Takeoff Weight: 477,000 pounds (216,634 kilograms)

Fuel Capacity: 265,274 pounds (120,326 kilograms)

Payload: 75,000 pounds (34,019 kilograms)

Speed: 900-plus mph (Mach 1.2 at sea level)

Range: Intercontinental

Ceiling: More than 30,000 feet (9,144 meters)

Armament: 84 500-pound Mk-82 or 24 2,000-pound Mk-84 general purpose bombs; up to 84 500-pound Mk-62 or 8 2,000-pound Mk-65 Quick Strike naval mines; 30 cluster munitions (CBU-87, -89, -97) or 30 Wind-Corrected Munitions Dispensers (CBU-103, -104, -105); up to 24 2,000-pound GBU-31 or 15 500-pound GBU-38 Joint Direct Attack Munitions; up to 24 AGM-158A Joint Air-to-Surface Standoff Missiles

Crew: Four (aircraft commander, copilot, and two weapon systems officers)

Unit Cost: \$283.1 million (fiscal 98 constant dollars)

Initial operating capability: October 1986

Inventory: Active force, 66 (test, 2); ANG, 0; Reserve, 0⁵⁵

⁵⁵ U.S. Air Force fact sheet on the B-1B, available online at <http://www.af.mil/information/factsheets/factsheet.asp?fsID=81>.

B-52 Bomber

May 2009 Air Force Testimony

The Air Force testified in May 2009 that:

The B-52 Stratofortress is our Nation's oldest frontline long-range strategic bomber, with the last airframe entering service with the United States Air Force in 1962. Given the expected service life of the aircraft, the B-52 airframes will be the longest operationally employed powered war machine in history, far surpassing the lifespan of any other single model land, sea or air weapon system. For more than 40 years B-52s have been the backbone of the strategic bomber force for the U.S. The B-52 is capable of dropping or launching the widest array of weapons in the U.S. inventory, including gravity bombs, cluster bombs, precision guided missiles and JDAMs. Updated with modern technology, the B-52 will be capable of delivering the full complement of Joint developed weapons and will continue into the 21st Century as an important element of our Nation's defenses.

The Air Force has invested in B-52 modernization programs to keep the platform operationally relevant by adding satellite and nuclear survivable and secure wideband high data rate communications; Sniper and LITENING Advanced Targeting Pods; aircraft computer and data transfer unit upgrades; and integration of smart weapons to improve conventional warfare capability.

Together with the B-1 and the B-2, the B-52 serves as a key component of the United States' long-range bomber force. It has earned respect as a highly capable conventional and nuclear combat platform during the Cold War, the Vietnam War, DESERT STORM, OAF, OIF, OEF, and frequently deploys to Guam to provide a continuous bomber presence mission in the Pacific. The B-52 continues to serve the Nation well as it has during its long and distinguished history, and we have provided significant support across the Future Years Defense Program in recognition of its value.⁵⁶

Air Force Fact Sheet

An online Air Force Fact Sheet on the B-52H bomber dated October 2007 stated the following:

Mission

Air Combat Command's B-52 is a long-range, heavy bomber that can perform a variety of missions. The bomber is capable of flying at high subsonic speeds at altitudes up to 50,000 feet (15,166.6 meters). It can carry nuclear or precision guided conventional ordnance with worldwide precision navigation capability.

Features

⁵⁶ Department of the Air Force Presentation to the House Armed Services Committee Subcommittee on Air and Land Forces, United States House of Representatives, Subject: Air Force Programs, Combined Statement of: Lieutenant General Daniel J. Darnell, Air Force Deputy Chief Of Staff For Air, Space and Information Operations, Plans And Requirements (AF/A3/5), Lieutenant General Mark D. Shackelford, Military Deputy, Office of the Assistant Secretary of the Air Force for Acquisition (SAF/AQ), Lieutenant General Raymond E. Johns, Jr., Air Force Deputy Chief of Staff for Strategic Plans And Programs (AF/A8), May 20, 2009, pp. 15-16.

In a conventional conflict, the B-52 can perform strategic attack, air interdiction, offensive counter-air and maritime operations. During Desert Storm, B-52s delivered 40 percent of all the weapons dropped by coalition forces. It is highly effective when used for ocean surveillance, and can assist the U.S. Navy in anti-ship and mine-laying operations. Two B-52s, in two hours, can monitor 140,000 square miles (364,000 square kilometers) of ocean surface.

All B-52s are equipped with an electro-optical viewing system that uses platinum silicide forward-looking infrared and high resolution low-light-level television sensors to augment targeting, battle assessment, and flight safety, thus further improving its combat ability and low-level flight capability.

Pilots wear night vision goggles (NVG) to enhance their vision during night operations. Night vision goggles provide greater safety during night operations by increasing the pilot's ability to visually clear terrain, avoid enemy radar and see other aircraft in a covert/lights-out environment.

Starting in 1989, on-going modifications incorporates the global positioning system, heavy stores adapter beams for carrying 2,000 pound munitions, and a full array of advance weapons currently under development.

The use of aerial refueling gives the B-52 a range limited only by crew endurance. It has an unrefueled combat range in excess of 8,800 miles (14,080 kilometers).

The aircraft's flexibility was evident in Operation Desert Storm and again during Operations Allied Force. B-52s struck wide-area troop concentrations, fixed installations and bunkers, and decimated the morale of Iraq's Republican Guard. The Gulf War involved the longest strike mission in the history of aerial warfare when B-52s took off from Barksdale Air Force Base, La., launched conventional air launched cruise missiles and returned to Barksdale—a 35-hour, non-stop combat mission.

During Operation Allied Force, B-52s opened the conflict with conventional cruise missile attacks and then transitioned to delivering general purpose bombs and cluster bomb units on Serbian army positions and staging areas.

Background

For more than 40 years B-52 Stratofortresses have been the backbone of the manned strategic bomber force for the United States. The B-52 is capable of dropping or launching the widest array of weapons in the U.S. inventory. This includes gravity bombs, cluster bombs, precision guided missiles and joint direct attack munitions. Updated with modern technology the B-52 will be capable of delivering the full complement of joint developed weapons and will continue into the 21st century as an important element of our nation's defenses. Current engineering analyses show the B-52's life span to extend beyond the year 2040.

The B-52A first flew in 1954, and the B model entered service in 1955. A total of 744 B-52s were built with the last, a B-52H, delivered in October 1962. Only the H model is still in the Air Force inventory and is assigned to Air Combat Command and the Air Force Reserves.

The first of 102 B-52H's was delivered to Strategic Air Command in May 1961. The H model can carry up to 20 air launched cruise missiles. In addition, it can carry the conventional cruise missile that was launched in several contingencies during the 1990s, starting with Operation Desert Storm and culminating with Operation Allied Force.

General Characteristics

Primary Function: Heavy bomber

Contractor: Boeing Military Airplane Co.

Power plant: Eight Pratt & Whitney engines TF33-P-3/103 turbofan

Thrust: Each engine up to 17,000 pounds

Wingspan: 185 feet (56.4 meters)

Length: 159 feet, 4 inches (48.5 meters)

Height: 40 feet, 8 inches (12.4 meters)

Weight: Approximately 185,000 pounds (83,250 kilograms)

Maximum Takeoff Weight: 488,000 pounds (219,600 kilograms)

Fuel Capacity: 312,197 pounds

Payload: 70,000 pounds (31,500 kilograms)

Speed: 650 miles per hour (Mach 0.86)

Range: 8,800 miles (7,652 nautical miles)

Ceiling: 50,000 feet (15,151.5 meters)

Armament: Approximately 70,000 pounds (31,500 kilograms) mixed ordnance—bombs, mines and missiles. (Modified to carry air-launched cruise missiles)

Crew: Five (aircraft commander, pilot, radar navigator, navigator and electronic warfare officer)

Unit Cost: \$53.4 million (fiscal 98 constant dollars)

Initial operating capability: April 1952

Inventory: Active force, 85; ANG, 0; Reserve, 9⁵⁷

⁵⁷ U.S. Air Force fact sheet on the B-52, available online at <http://www.af.mil/information/factsheets/factsheet.asp?fsID=83>.

Appendix B. 1992-2002 Plans for Bomber Modernization

This appendix presents plans for modernizing the bomber force from 1992 until the 2006 QDR.

1992 U.S. Air Force Bomber Roadmap

In 1992, the Air Force published a bomber roadmap to guide the development of the bomber force in the post-Cold War security environment. A key goal of the roadmap was to set forth a plan for converting the bomber fleet from a nuclear-centric force to a force with more of a conventional mission focus.⁵⁸ The newly formed Air Combat Command (ACC)⁵⁹ implemented the roadmap by funding upgrades needed to enhance the bomber force's conventional weapons delivery capability, by developing a bomber concept of operations to more effectively incorporate the bomber into conventional operations, and by shifting training away from the nuclear mission and towards missions conducted in a conventional theater air campaign. The 1992 roadmap concluded that a bomber force of 95 B-52Hs, 96 B-1Bs, and 20 B-2s (211 heavy bombers in all) would meet current and future requirements. The roadmap also declared the B-1 as the "backbone of the conventional bomber force" and that future bomber investments would focus on B-1 conventional enhancements.⁶⁰

1993 Bottom-Up Review (BUR)

DOD's 1993 Bottom-Up Review (BUR) of U.S. defense plans and programs called for a U.S. military force structure that would permit the United States to conduct two nearly simultaneous major regional conflicts. The 1993 BUR called for a force of 100 heavy bomber aircraft to conduct the first regional conflict and for an overall bomber force of 184 aircraft.⁶¹ The 1993 BUR echoed the 1992 roadmap's recommendations to upgrade the bomber fleet to enable bombers to carry the latest advanced conventional munitions.⁶² Some observers voiced concerns over the reduction in bomber numbers called for in the 1993 BUR. The ACC commander at the time stated that the nation needed about 180 operational bombers to handle two major regional conflicts, plus additional non-operational aircraft for backup inventory, attrition reserves, and flight testing.⁶³

⁵⁸ Department of the Air Force, *Enhancing the Nation's Conventional Bomber Force: The Bomber Roadmap*, June 1992, p. 1.

⁵⁹ ACC was established on June 1, 1992, combining the units of the inactivated commands of Tactical Air Command (TAC) and Strategic Air Command (SAC). ACC essentially combined the Air Force's tactical fighter aircraft and strategic bomber aircraft under one major command.

⁶⁰ 1992 US Air Force Bomber Roadmap, p. 6.

⁶¹ 1993 Department of Defense "Bottom-Up Review" (Section 2: Defense Strategy for the New Era).

⁶² Gunzinger, Mark, *Beyond The Bottom-Up Review*, National Defense University Institute for National Strategic Studies.

⁶³ Gunzinger, *Beyond The Bottom-Up Review*.

1994 Nuclear Posture Review (NPR)

The 1994 Nuclear Posture Review (NPR) endorsed decision in the 1992 roadmap to reorient the B-1B to a conventional-only role. It called for a force of 66 B-52s and no more than 20 B-2s to support the nuclear mission.⁶⁴ If requirements for bombers were set by nuclear missions alone, such a force would permit the B-52 force called for in the 1993 BUR to be reduced by another 28 aircraft. The 1994 NPR acknowledged the B-52's limited survivability in high-threat environments and relegated the aircraft in nuclear operations to a role of delivering standoff-ranged air-launched cruise missiles (ALCMs).⁶⁵

1995 DOD Heavy Bomber Force Study

The 1995 DOD Heavy Bomber Force Study was a classified study initiated by congressional direction. Under Secretary of Defense for Acquisition and Technology, Paul Kaminski, presented an unclassified summary of the study to the National Security subcommittee of the House Appropriations Committee in May 1995. The study concluded the following:

- the currently planned bomber force of 181 aircraft was sufficient to handle two nearly simultaneous major regional contingencies;
- procuring additional advanced guided munitions was more cost effective than procuring 20 additional B-2s;
- the planned bomber force with accurate guided munitions would provide a prudent hedge against threat uncertainties; and
- planned B-1 conventional upgrades were more cost effective than procuring 20 additional B-2s.

The study stressed the value of shorter-range tactical aircraft, noting that “once all the tactical air forces are in place and fully employed—the bomber contribution shrinks to a small portion of the overall aggregate force.”⁶⁶

A 1996 GAO report on bombers took exception to the Heavy Bomber Force Study, along with the 1992 roadmap, the 1993 BUR, and the 1994 NPR, stating that DOD's requirement for 181 bombers was overstated given DOD's other ground-attack capabilities and the unified commanders in chief plans for using bombers. GAO agreed with DOD's desire not to procure additional B-2s, but judged that a reduction or elimination of the B-1 fleet was warranted with minimal risk.⁶⁷

⁶⁴ Department of Defense news release, “DOD Review Recommends Reduction in Nuclear Force,” September 22, 1994.

⁶⁵ The Nuclear Information Project, “1994 Nuclear Posture Review,” July 8, 2005, at <http://www.nukestrat.com/us/reviews/npr1994.htm>; accessed on January 17, 2008.

⁶⁶ Source: Under Secretary of Defense Kaminski's Congressional testimony, May 17, 1995.

⁶⁷ General Accounting Office, *Air Force Bombers: Options to Retire or Restructure the Force Would Reduce Planned Spending*, GAO-NSIAD-96-192, September 1996, 88 pp.

1997 Quadrennial Defense Review

DOD's 1997 Quadrennial Defense Review (QDR) produced no major changes to the recommended bomber fleet. The QDR recommended sustaining the bomber fleet at 187 aircraft,⁶⁸ including 71 B-52Hs, 21 B-2s, and 95 B-1Bs.⁶⁹ While the QDR acknowledged that additional B-2s would help the United States in the initial phase of a major regional conflict, the QDR judged that it would not be cost-effective to procure additional B-2s in light of other pressing needs.⁷⁰ A congressionally mandated independent bomber review, chaired by Brent Scowcroft, was highly critical of the 1997 QDR's decision not to procure additional B-2s. Unlike the 1996 GAO report on bombers, which called for reducing bomber numbers in light of, among other things, the capabilities of tactical aircraft, Scowcroft's review stated that the "Pentagon's preference for short-range instead of long-range air power raises a puzzling contradiction." The Scowcroft study stated that the long-range bomber fleet is well suited to the demands of the new security environment and that long-range air power will be increasingly important in coming decades. The Scowcroft study concluded that "current plans for the long-range air power force were woefully deficient," and called for Congress to, at a minimum, fund at least one additional B-2 squadron of nine aircraft.⁷¹

1999 USAF White Paper on Long-Range Bombers

The 1999 USAF White Paper on Long-Range Bombers modified aircraft requirements slightly by increasing the B-52 "attrition reserve" by five aircraft to compensate for sustainment issues.⁷² The new requirement is 76 B-52s, 93 B-1s, and 21 B-2s, with 130 bombers being "combat-coded" for operational taskings.⁷³ The study presented a replacement aircraft timeline, as requested by Congress the previous year, calling for a new bomber to reach Initial Operational Capability (IOC) by 2037.⁷⁴ The study endorsed the Air Force's focus on modifying the current bomber fleet.

2001 QDR and 2001 Long-Range Strike White Paper

The 2001 QDR called for a force of 112 "combat-coded" bomber aircraft.⁷⁵ Following the completion of the 2001 QDR, the Air Force updated its 1999 White Paper on Long-Range Strike. The updated 2001 white paper called for a 34-aircraft reduction in "combat-coded" bombers and a total bomber force of 157 aircraft. To arrive at this force structure, the paper stated that 33 B-1s and 17 B-52s would be retired by the end of 2002. Retirements and other alignments would result

⁶⁸ The bomber requirement increased from 181 to 187 in 1995 with decisions to fund the conversion of one B-2 test aircraft to an operational aircraft and to increase the B-52 requirement from 66 to 71 aircraft because to meet a desire for a larger attrition reserve force.

⁶⁹ 1997 Quadrennial Defense Review, Section V: Forces and Manpower, May 1997.

⁷⁰ Correll, John, T. "The B-2 and Beyond," *Air Force Magazine*, July 1998.

⁷¹ Source: Brent Scowcroft's testimony before the Military Procurement Subcommittee of the House National Security Committee, June 23, 1997.

⁷² 1999 USAF White Paper on Long-Range Bombers, March 1, 1999, p. 2.

⁷³ Seventy B-1s, 44 B-52s, and 16 B-2s made up the "combat-coded" fleet of 130 bombers.

⁷⁴ 1999 USAF White Paper on Long-Range Bombers, March 1, 1999, p. 21. The House National Security Committee's report (H.Rept. 105-532 of May 12, 1998) on the FY1999 defense authorization bill (H.R. 3616) requested the Air Force to develop a "timeline for consideration of the acquisition of a follow-on bomber."

⁷⁵ Department of Defense, *Quadrennial Defense Review Report*, September 30, 2001, p. 22.

in an overall fleet of 76 B-52s, 60 B-1s, and 21 B-2s. The 96 “combat” aircraft called for in the white paper were 16 less than the 112 “combat-coded” aircraft called for in the 2001 QDR. The Air Force stated that savings from retiring B-1s would be invested in remaining B-1s, and that “it is far more cost-effective to upgrade current bombers than it is to procure new aircraft.” The white paper stated that prior conclusions about bomber service lives might no longer be valid due to operational and force-structure changes. The white paper noted that B-52s no longer fly regularly at low-level and stated that bomber fleet reductions would provide funding for fleet-wide improvements. The paper stated that these developments might lead some to conclude that requiring a bomber by 2037 was premature.⁷⁶

2002 Nuclear Posture Review (NPR)

The 2002 Nuclear Posture Review called for a force 76 B-52s and 21 B-2s for nuclear missions. The study supported Air Force plans at the time for a new bomber in the 2040 time frame, but also stated that “a need for additional or improved bomber capabilities could, however, move the ‘need date’ closer to the present.”⁷⁷

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⁷⁶ 2001 USAF White Paper on Long-Range Strike, November 2001.

⁷⁷ 2002 Nuclear Posture Review. Excerpt retrieved from Global Security at <http://www.globalsecurity.org/wmd/library/policy/dod/npr.htm>.